



CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

Name(s) Stella R. Crall	Project Number 31296
Project Title Fresh, Frozen, or Off the Tree, Which Has More Vitamin C?	
Objectives/Goals This project focuses on whether the amount of Vitamin C diminishes over time in different types of orange juice. The juices I will be testing are freshly squeezed orange juice from a tree, store-bought in a container, and frozen orange juice. I will also be testing a Vitamin C solution (made from a tablet) as my control.	
Abstract For the first step, I needed to make one gallon of indophenol solution. (Indophenol is a Vitamin C indicator.) Then I tested Vitamin C tablets in a solution to use as a control sample. Before I started to test the juice I needed to pick the 6 fresh oranges to make the fresh orange juice, buy fresh squeezed pre-packaged orange juice, and make orange juice from a frozen concentrate package. For each type of juice I needed to measure out 10 ml of the indophenol solution and 10 ml of water. I then used a medicine dropper to add the juice to the indophenol solution and to the water, counting the drops until the two liquids became the same color. Then I repeated this process each day for the next 10 days and made a graph to show exactly how much Vitamin C decreased during the test period and the difference in the amount of Vitamin C between the different types of juices.	
Methods/Materials For the first step, I needed to make one gallon of indophenol solution. (Indophenol is a Vitamin C indicator.) Then I tested Vitamin C tablets in a solution to use as a control sample. Before I started to test the juice I needed to pick the 6 fresh oranges to make the fresh orange juice, buy fresh squeezed pre-packaged orange juice, and make orange juice from a frozen concentrate package. For each type of juice I needed to measure out 10 ml of the indophenol solution and 10 ml of water. I then used a medicine dropper to add the juice to the indophenol solution and to the water, counting the drops until the two liquids became the same color. Then I repeated this process each day for the next 10 days and made a graph to show exactly how much Vitamin C decreased during the test period and the difference in the amount of Vitamin C between the different types of juices.	
Results The fresh orange juice had the most Vitamin C over the 10 days but it also diminished the most during that time. The frozen lost the least even though it had the least amount of Vitamin C to begin with. Vitamin C in container juice did diminish over time, more than the fresh squeezed and less than the frozen.	
Conclusions/Discussion My hypothesis was that the frozen orange juice would have the least amount of Vitamin C lost over the 10 days because when the juice was frozen it froze the Vitamin C. When I thawed the juice, I thought the Vitamin C would stay in the juice longer. My hypothesis was correct; the frozen juice lost the least amount of Vitamin C. I did notice that one day I did not shake the juice before testing and that made the Vitamin C content significantly less. If I were to test this again, I would see if shaking the orange juice before testing would make a difference.	
Summary Statement This project tests the amount of Vitamin C lost over time in different types of orange juice.	
Help Received My dad helped me mix the solutions.	